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To What Extent Does Physical Activity and Standard of Competition Affect Quantitative Ultrasound (QUS) Measurements of Bone in Accordance with Muscular Strength and Anthropometrics in British Young Males?

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Abstract : Introduction: Evidences of relationship between bone, muscle and standard of competition among young British population is limited in literature. The current literature recognises the independent and synergistic effects of fat free and fat mass as the stimulus for osteogenesis. This study assessed the extent to which physical activity (PA) and standard of competition (CS) influences quantitative ultrasound (QUS) measurements of bone on a cross-sectional basis accounting for muscular strength and anthropometrics in British young males. Methods: Pre-screening grouped 66 males aged 18-25 years into controls (n=33) and district level athletes (DLAs) (n=33) as well as low (n=21), moderate (n=23) and high (n=22) physical activity categories (PACs). All participants underwent QUS measurements of bone (4 sites, i.e. dominant distal radius (DR), dominant mid-shaft tibia (DT), non-dominant distal radius (NR) and non-dominant mid-shaft tibia (NT)), isokinetic strength tests (dominant and non-dominant knee flexion and extension) and anthropometric measurements. Results: There were no significant differences between any of the groups with respect to QUS measurements of bone at all sites with regards to PACs or CS. Significant higher isokinetic strength values were observed in DLAs than controls ($p < 0.05$), and higher than low PACs ($p < 0.05$) at 60o.s-1 of concentric and eccentric measurements. No differences in subcutaneous fat thickness were found between all the groups (CS or PACs). Percentages of body fat were significantly higher ($p < .05$) in low than high PACs and CS groups. There were significant positive relationships between non dominant radial speed of sound and fat free mass at both DR ($r=0.383$, $p=0.001$) and NR ($r=0.319$, $p=0.009$) sites in all participants. Conclusion: The present study findings indicated that muscular strength and body fat are closely related to physical activity level and standard of competition. However, bone health status reflected by quantitative ultrasound (QUS) measurements of bone is not related to physical activity level and standard of competition in British young males.

Keywords : bone, muscular strength, physical activity, standard of competition
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